Biogeographic variation in European green crab abundance, morphology, and behavior

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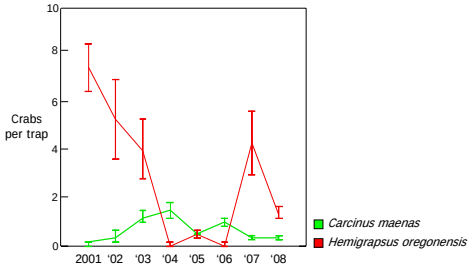
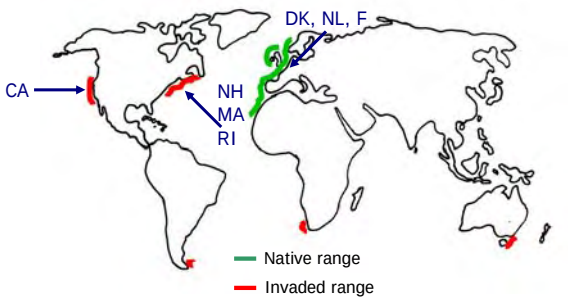
1 Background

The European green crab, *Carcinus maenas*

- was introduced via ballast water to the US East Coast 200 years ago and the US West Coast 20 years ago
- has been shown to have considerable impacts on invertebrate community structure
- seems to be displacing native crabs in Elkhorn Slough
- Species invasions are rarely quantified across a broad geographical range or studied from the perspective of the invader



Increases in green crab abundance in Elkhorn Slough, CA, has coincided with a decrease in native crab abundance.



2 Research Goals

The focus of my research is to

1. Develop and compare different indicators of invasion success:
   Relative abundance, habitat breadth, size distribution, aggression levels
2. Characterize variation in these indicators at a biogeographic scale

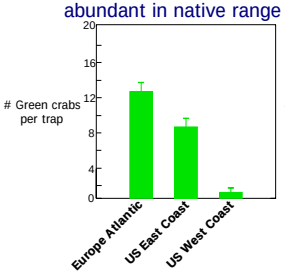
3 Methods

To quantify variation in invasion success I

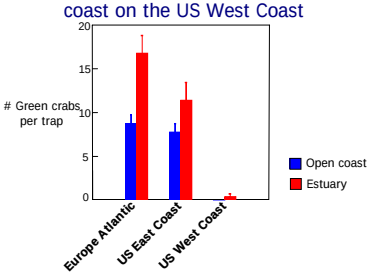
- trapped crabs the US West Coast, US East Coast, EU Atlantic Coast 2006-2007
- In each region, traps were set in an estuary and on adjacent open coast
- All individuals were measured with respect to carapace width and fecundity
- Aggression indices were determined from time budget observations of male/male green crabs in the lab

4 Results

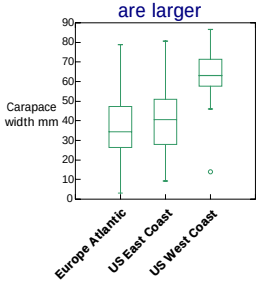
Green crab – most abundant in native range



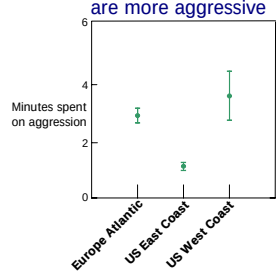
Green crab – not found on open coast on the US West Coast



California green crabs are larger



California green crabs are more aggressive



5 Summary

Green crabs are

- more successful in the native range with respect to abundance, being about 10 times more abundant relative to the US West Coast
- less abundant in California than in Massachusetts; however they have only been in CA 20 years and in MA about 200 years
- not found on the open California coast. Although they are found on the open coast elsewhere, they are more abundant in estuaries
- more successful in the invaded range at the individual level, being significantly larger in California
- most aggressive in California

6 Implications

Green crab management

- might be more effective when the abundance is low
- might be focused on estuaries, since estuarine habitats are vulnerable to species invasions
- might be more important when green crabs are highly aggressive

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